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UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration

July 2, 1947

Area Memorandum No. 1

TO ALL REA BORROWERS IN TVA AREA:

Subject: Standardization of Voltages

It is desirable in the interest of economics and the interchange of equipment to select preferred voltage ratings for all types of equipment. It is not the intent that all equipment having a rating other than this standard will be replaced, but rather as additions are made the preferred voltage will be used. The use of these preferred voltages will eliminate some of the confusion which now exists.

Secondary Voltage

The nominal secondary voltage will be 120 volts. The "favorable zone" of voltage will be 110 to 125 volts at the consumer's meter. The "tolerable zone" will be 107 to 127 volts at the consumer's meter. This means with a normal secondary voltage, operation is favorable if the voltage varies between the limits of 110 and 125 volts. System operation is tolerable if between the limits of 107 to 127 volts. The primary voltage rating of all purchased equipment will be 120 volts or multiples thereof.

7200 Volt Distribution

Systems having this voltage classification will purchase 7200-120/240 or 7200-240/480 volt transformers. There is a proposed revision of the taps on distribution transformers as follows:

Present Standard	Proposed Standard
3 - 4-1/2% taps	4 - 2-1/2% taps
<u>7200</u>	<u>7200</u>
6875	7020
6545	6840
6220 (at reduced kva)	6660
	6480

The underlined voltage is the nameplate rating. By agreement manufacturers provide the present standard taps on REA transformers. Specify only REA standard taps on your purchase orders.

The nominal substation service voltage for 7200 volt distribution systems should be 7500/13,000 volts to allow about 5 percent drop from that point to the transformers located an average distance from the substation. The nominal circuit voltage would be 7200/12,500 volts.

7620 Volt Distribution

There are only two systems having this voltage classification: Tennessee 38 Jefferson (Appalachian Electric Cooperative) and Tennessee 48 Lauderdale (Forked Deer Electric Cooperative). These will be continued. No borrower should shift to this voltage without proper engineering analysis and approval. The nominal substation service voltage of this class of systems should be about 8000/13,800 volts and the nominal circuit voltage should be 7620/13,200 volts.

The voltage ratings of these transformers with 4 - 2½ percent taps are:

7620
7430
7234
7049
6858

2400 Volt Distribution

The preferred substation service voltage for these distribution systems should be 2500 volts and the nominal circuit voltage should be 2400 volts. If it is necessary to purchase distribution transformers for this class, 2400 - 120/240 or 2400 - 240/480 volt transformers should be purchased, but purchases should be held to a minimum. Cooperatives having 2.4 - 7.2/12.5 kv substations for the purpose of supplying a town with power at 2400 volts will limit, insofar as practical, the demand on the 2400 volt system to the capacity of the existing facilities. Old loads or additional new loads, when located where it is possible to do so, will be transferred to the 7.2/12.5 kv system rather than increase the capacity of the 2400 volt substation. If, regardless of your efforts, it becomes necessary to install larger stepdown stations, transformers of 500 kva capacity and less shall be rated 7,200/12,500 to 2400 volt with four 2½ percent full capacity taps below normal voltage. It is felt that only 15 kv line insulation should be used when making changes in or addition to the 2.4 kv systems. There will be little increased expenditure to build the line for higher voltage service and to operate at the lower voltage. Furthermore, the system can be converted readily to a higher voltage if this becomes desirable.

6900 Volt Distribution

Many distribution transformers of the above rating are in existence. They are nearly all 6900 to 115 volt ratio and were listed by manufacturers as suitable for operation at 7200 to 120 volts with 6900 volts preferred. All such transformers may be used on distribution circuits of nominal 7200/12,500 volt rating, preferably near the end of the circuits.

6600 Volt Distribution

Some transformers of the above rating for wye connections, and 11,500 volt transformers for delta connection, are odd ratio to yield a secondary voltage of 110 or 115 when connected to 11,500 volt lines. They are not suitable

3-To All REA Borrowers in TVA Area

for connection to 12,500 volt nominal voltage lines except at points remote from the substations where the primary voltage is lowest. These transformers should gradually be moved to points at least ten miles from a substation or voltage regulator, and no transformers of this voltage rating should be purchased.

Transformer Connections

Transformers for three-phase banks should have two high voltage bushings and will be connected Y-delta with the neutral floating on the high side. The transformer rating will be 7200 - 120/240 or other secondary rating in special cases. If it is necessary to provide 480 volt service, the transformers to be purchased should have a recommended secondary rating of 240/480. This will provide greater flexibility.

Purchase Orders

It is suggested that purchase orders inconsistent with this recommendation be revised and the manufacturers be notified immediately.

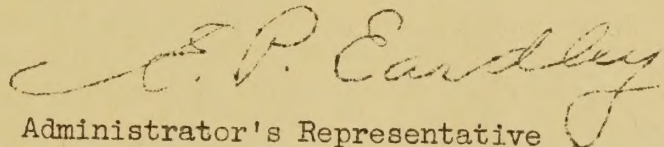
Price

There is no differential in price under the REA group purchase plan between 7620 volt transformers and 7200 volt transformers.

This memorandum is based upon a study made by the Tennessee Valley Authority and the Rural Electrification Administration.

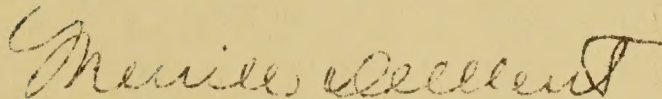
NOTE: The preferred voltage rating, "favorable zone," "tolerable zone" are as defined and outlined in "Preferred Voltage Rating for AC Systems and Equipment," NEMA Publication No. 113, dated November 1946.

RURAL ELECTRIFICATION ADMINISTRATION



Administrator's Representative
TVA Area

TENNESSEE VALLEY AUTHORITY



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